



#281

APOLLO 15 + 16

LUNAR ORBIT X-RAY + TRANSEARTH COAST X-RAY

71-063A-09A, 09B

72-031A-08A

Apollo 15 CSM

TRANSEARCH COAST X-RAY DATA

71-063A-09B

This data set has been restored. There was originally one 9-track, 800 BPI tape written in Binary. There is one restored tape. The DR tape is a 3480 cartridge and the DS tape is 9-track, 6250 BPI. The original tape was created on an IBM 360 computer and the restored tape was created on an IBM 9021 computer. The DR and DS numbers along with the corresponding D number are as follows:

DR#	DS#	D#	FILES	TIME SPAN
DR005893	DS005893	D014016	1	08/04/71 - 08/07/71

## APOLLO 16 CSM

## LUNAR ORBIT X-RAY DATA

72-031A-08A

This data set has been restored. There was originally one 9-track, 1600 BPI tape written in Binary. There is one restored tape. The DR tape is a 3480 cartridge and the DS tape is 9-track, 6250 BPI. The original tape was created on an IBM 360 computer and the restored tape was created on an IBM 9021 computer. The DR and DS numbers along with the corresponding D number are as follows:

DR#	DS#	D#	FILES	TIME SPAN
DR005688	DS005688	D022495	1 - 2	04/20/72 - 04/24/72

Apollo 15 CSM

LUNAR ORBIT X-RAY DATA

71-063A-09A

This data set has been restored. There was originally one 9-track, 1600 BPI tape written in Binary. There is one restored tape. The DR tape is a 3480 cartridge and the DS tape is 9-track, 6250 BPI. The original tape was created on an IBM 360 computer and the restored tape was created on an IBM 9021 computer. The DR and DS numbers along with the corresponding D number are as follows:

DR#	DS#	D#	FILES	TIME SPAN
DR005687	DS005687	D014017	1 - 2	07/30/71 - 08/04/71

REQ. AGENT  
WPP  
CMM  
VJP

RAND NO.  
RB5604  
RC4834

ACQ. AGENT  
CDW

APOLLO 15 + 16

LUNAR ORBIT X-RAY + TRANSEARTH COAST X-RAY

71-063A-09A

71-063A-09B

72-031A-08A

This data set consists of 1 Apollo 15 Lunar Orbit X-ray data, 1 Apollo 15 Transearth Coast X-ray data and 1 Apollo 16 Lunar Orbit X-ray data tape. Data set 71-063A-09B is 800 BPI, BIN and containing 1 file. The D tape is 9 track and the C tape is 7 track. Data sets 71-063A-09A and 72-031A-08A are 1600 BPI, BIN, 9 track and contains 2 files each. All 3 tapes were created on the IBM 360.

The time spans are as follows:

71-063A-09A      APOLLO 15

<u>D#</u>	<u>C#</u>	<u>FILES</u>	<u>TIME SPAN</u>
D-14017	C-12712	2	7/30/71 - 8/04/71

71-063A-09B      APOLLO 15

D-14016	C-12711	1	8/04/71 - 8/07/71
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72-031A-08A      APOLLO 16

D-22195	C-17290	2	4/20/72 - 4/24/72
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UNITED STATES GOVERNMENT

# Memorandum

TO : Dr. Wende - Code 601.1  
National Space Science Data Center

FROM : Richard Schmadebeck - Code 682  
Project Engineer

SUBJECT: Delivery of the Apollo 15 and 16 X-ray Spectrometer Data Tapes.

DATE: October 21, 1975

I am enclosing the lunar portions of the Apollo 15 and 16 X-ray data. These data tapes are cleaned up versions of the original raw data which composed some two hundred tapes in all. Both tapes have the same format, DCB information, and two file structures. These were generated on an IBM S360/91 here at Goddard. The tape characteristics are:

- 1) Tape File #1 - Normal X-ray and calibration data where the energy region was from 0.75 to 3.0 kilo electron volts (kev) for all four detectors.
- 2) Tape File #2 - All detectors except detector #1 (i.e. the detector with only the beryllium window) have the same energy range as before 0.75 to 3.0 kev. The energy range of detector one is 1.5 to 6.0 kev.

NOTE: Calibration and non calibration data is randomly interspersed but identifiable on tape files 1 and 2.

- 3) Non Labeled Industry compatible 9 track tapes.
- 4) Density = 1600 bits per inch.
- 5) RECFM (Record format) = VBS (Variable Block Size)
- 6) LRECL (Length of record) = 900
- 7) BLKSIZE (Maximum Block Size) = 27004
- 8) Data Format: The data format consists of an integer number (NFLAG), followed by eight single precision floating point numbers "ANS (8)". This data is then followed by 36 integer numbers "ISPEC (4,9)".

"NFLAG" Indicates in which mode the measurement was made. They are defined as follows:

"NFLAG" = 16 Spectrometer measuring normal data (i.e. energy range from 0.75 to 3.0 kev)



17-004-026  
71-0078-C-AE MP 2

"NFLAG" = 96 Calibration sources of magnesium K alpha and Fe<sup>55</sup> have been placed in the field of view of detectors 1, 2, 3. Energy range is from 0.75 to 3.0 kev.

"NFLAG" = 144 Normal data for detectors 2 through 4 (i.e. from 0.75 to 3.0 kev). Detector 1 energy range from 1.5 to 6.0 kev).

"NFLAG" = 224 Spectral range is the same as for NFLAG = 144 but the calibration sources have been rotated into the field of view of detectors 1, 2, 3.

"ANS (1)" is the ground elapsed time in seconds.

"ANS (2)" is the lunar orbit number.

"ANS (3)" is the selenographic latitude in degrees.

"ANS (4)" is the selenographic longitude in degrees from 180 to -180 degrees as per the orbital path.

"ANS (5)" is the altitude of the spacecraft above the lunar surface in kilometers assuming a mean circular moon (i.e. no corrections for terrain have been made).

"ANS (6)" is the spacecraft pitch angle.

"ANS (7)" is the spacecraft yaw angle.

"ANS (8)" is the spacecraft roll angle.

"ISPEC (4,9)" is hereby defined as "ISPEC (I,J)" where I = 1 is the beryllium windowed counter, I = 2 is the magnesium filtered counter, I = 3 the aluminum filtered counter, and I = 4 the solar monitor. For each detector J = 1 to 7 represents the seven equal energy intervals into which the energy regions were divided. All x ray events above the upper level discriminator are stored in J = 8. All non x ray events are stored in J = 9 except for the solar monitor detector where the sum of all events in all four detectors channels 1 through 8 is stored. This number is then divided by 16 and telemetered to the ground. Thus if all the events in channels 1 to 8 for all four detectors are summed and divided by 16 and compared with this number the data quality can be determined. This number will differ slightly because all the events detected were not analyzed because of dead time problems, but if there is a very large difference the data should be scanned for possible errors which may have been missed during the screening process.

NOTE: These data sets normally represent the accumulation of data for 8 seconds time.

100-1000-164  
71-0132 001-1

Specifically Data tape CA0439 contains the data from Apollo 15. File 1 contains 26,843 data sets between 85 hours 10 minutes and 220 hours 49 minutes. This is all of the recoverable normal and calibration data. File 2 contains 7,086 attenuation data sets between 90 hours 35 minutes and 214 hours 07 minutes.

Data tape CA0438 contains all of the recovered lunar data from Apollo 16. File 1 contains 24,577 normal data sets between 80 hours 04 minutes and 191 hours 56 minutes. File 2 contains 6,965 Data sets between 85 hours 51 minutes and 193 hours 31 minutes.

71-063A-09

Apollo 15

(from Schmidbeck # 5941 or 6881)

The enclosed list shows the word number, symbol, and parameter name (with units) for each of the 39 emphemeris values recorded on the X-ray merge tape. The emphemeris values are a subset of those values originally provided to the principal investigators by MSC. The definitions and coordinate systems called for in the list are taken directly from "Apollo Postflight Trajectory Parameters" MSC 04404.

### SUBROUTINE XINTGN(KK)

The purpose of this subroutine is to interpolate the emphemeris data stored in the D vector at one-minute intervals to give emphemeris values at the spectrum GETS stored in GT. The interpolated values are SPLINE interpolated and stored in the vector ANS for transfer to the main or calling program. Most of this subroutine will be self-explanatory as well as SPLINE subroutine which follows it.

## SUBROUTINE XRY(IEOF, LONG)

### I. General

This subroutine is used to read only the Apollo 15 'XRAY' merge tape and output certain desired data with its associated empheris data interpolated to give the empheris data for the midpoint of each set of summed spectra. The format of the data tape is written as follows: GANDN(39),NSPECT,[GET,XRAY(2,110),GET,(XRAY(2,110)....], GANDN(39) etc. The number of GET and XRAY data sets will equal the value of NSPECT. There will be no GET,XRAY data sets if NSPECT is equal to zero. The actual interval of XRAY data is from 306600. seconds GET to 795000. seconds.

Only 8 values of the 39 values of empheris data for each minute (GANDN(39)) are actually used in this subroutine. The format of the XRAY data is as follows:

- a) The cal/attenuate flags are XRAY(1,5); XRAY(2,5); XRAY(1,6);  
and XRAY(2,6)  
*PULSE SHAPE DISCRIMINATOR*
- b) PSD and TOTAL values are at XRAY(2,1) through XRAY(2,4) in sequence and the valid data flag for each value is in the appropriate position from XRAY(1,1) to XRAY(1,4)
- c) The X-ray spectral data is stored in order in the locations from XRAY(2,6) through XRAY(2,38) and their associated validity flags from XRAY(1,6) to XRAY(1,38).
- d) The Housekeeping data for the 8-second period is stored from XRAY(2,39) on with the valid data flag from XRAY(1,39) onward.

## II. Main Body of the Subroutine

- a) Lines 800 to 3100 initialize the parameters upon entrance into the subroutine.
- b) Lines 3200 to 7650 concern the reading of emphemeris data and the checking for quality.
- c) Lines 7700 to 13000 concern the reading of the X-ray data, quality checking, and summing of the data.
- d) Lines 13500 to 15700 concern the storage of the summed data into SPECT.
- e) Lines 15800 to 17200 deal with the preparation for exit from the subroutine to the main or calling program.

## III. Input Data Using the Call Statement

- a) 'IEOF' is a flag used to determine the condition encountered during a previous call to the subroutine. For the first call to the subroutine, IEOF should be set to a minus one. When the subroutine returns control to the calling program, the value of IEOF will indicate the reason for terminating the tape reading. These condition codes are:

IEOF=1 indicates 300 spectra (M=300) or 300 loss of syncs have been encountered (LSYNC=300). The reason for termination is not to overflow either SPECT(300,4,10) or SYNC(300).

IEOF=2 indicates that either 300 emphemeris data sets have been encountered (KK=300) or that 3 emphemeris data sets have been encountered containing zero spectra.

IEOF=3 indicates that the last time of interest GETS(2) has been exceeded.

IEOF=4 indicates that an end of file during a tape read has been encountered. The end of file mark appears only at the end of the whole data tape.

- b) 'LONG' is a real vector of length two which is used to look at areas between longitude one and longitude two. Longitude one is the east longitude and longitude two is the western longitude. This option can only be used if IOUT(1)=2.

#### IV. Common Areas

- a) /INPDAT/
  - 1) 'NFC' is the number of the first channel of the area over which the data will be summed.
  - 2) 'NCH' is the number of the last channel of the area over which the data will be summed.
  - 3) 'ACCTIM' is the amount of time over which the spectrum will be accumulated. This must be some multiple of 8 seconds.

4) 'I $\emptyset$ UT' is a vector of length 6 which is used mainly in the calling program to eliminate unnecessary printout during the running of the program. The only area of concern in this subroutine is I $\emptyset$ UT(1).

I $\emptyset$ UT(1)=0 deletes most of the printout of the data being read from the tape.

I $\emptyset$ UT(1)=1 allows the printout of all of the data being read from the merged tape

I $\emptyset$ UT(1)=2 allows both printout and the use of only that data which lies between LONG(1) and LONG(2).

5) 'GETS' is a vector of length two which contains the beginning GET accumulation time (GETS(1)) and the end accumulation time (GETS(2)).

b) /INF $\emptyset$ /

1) 'ANS' is a vector of length 300 and 8 values of GANDN data interpolated at the midpoint of the accumulation period.

a. ANS(m,1) is the GET of the midpoint of the accumulation period in seconds.

b. ANS(m,2) is the orbit number.

c. ANS(m,3) is the selenographic latitude of the midpoint of the accumulation period.

- d. ANS(m,4) is the selenographic longitude of the midpoint of the accumulation period
  - e. ANS(m,5) is the altitude in nautical miles above the lunar surface.
  - f. ANS(m,6) is the spacecraft angle Theta in degrees.
  - g. ANS(m,7) is the spacecraft angle PSI in degrees.
  - h. ANS(m,8) is the spacecraft angle PHI in degrees.
- 2) SPECT is an integer vector of up to 300 spectra consisting of a spectrum for each of the 4 detectors, with ten values for each spectrum. The detectors are numbered 1 to 3 and number 4 is the solar monitor. The 9th value in each spectrum is the PSD value for each detector. The solar monitor channel 9 is the so-called TOTAL value. The 10th value in each spectrum is the total sum of the channels between NFC and NCH.
- 3) NFLAG is a vector of length 300 which contains the calibrator/attenuation flag bits.
- 4) NC is a vector which contains the number of actual spectra accumulated during the time period ACCTIM.
- 5) NSPEC is the number of spectra actually stored in ANS and SPECT.

c) /RATIØ/

- 1) NDUM is not used in this program.
- 2) SYNC is the vector which contains the GET of any lost syncs or zero spectra.
- 3) NSYNC is the number of lost SYNCs associated with the GET stored in SYNC.
- 4) NZERO is the number of zeros encountered in each spectrum associated with the GET stored in SYNC.
- 5) D is the vector which contains the emphemeric values which will be used in the interpolations to get the longitude, etc. for each spectrum.

V. Dimensioned Variables

- a) CHSM is an intermediate storage location which is used to store the sums of the spectra during the counting period.
- b) XRAY is a vector which contains the raw X-ray spectra and housekeeping data as recorded in the PCM stream. Most of the values of XRAY(1,m) are flag bits associated with values of XRAY(2,m). The housekeeping data is stored from in XRAY where m = 39 to 110. Each housekeeping value is repeated eight times to cover the eight-second sample time. The values of housekeeping are stored as follows:

7.1.1

XRAY(2,39) is the low voltage power supply summed.  
XRAY(2,47) is the discriminator reference voltage.  
XRAY(2,55) is the +6.75 volt power supply.  
XRAY(2,63) is the +5.0 volt power supply.  
XRAY(2,71) is the processor electronics temperature.  
XRAY(2,79) is the detector temperature.  
XRAY(2,87) is the low voltage power supply temperature.  
XRAY(2,95) is the lunar detector temperature.  
XRAY(2,103) is the solar detector temperature.

This subroutine makes no effort to retrieve and save these values.

<u>GANDN Word No.</u>	<u>Symbol</u>	<u>Parameter (Units)</u>
1	$GMT_s$	Greenwich mean time from midnight preceding launch (sec.)
2	$GET_H$	Ground elapsed time from launch (hr.)
3	$GET_s$	Ground elapsed time from launch (sec.)
4	Rev. No.	Current incremental revolution (n.d.)
5	$\Phi_s$	Selenographic latitude (deg.) with 0 degrees being the equator of the moon.
6	$\lambda_s$	Selenographic longitude (deg.) measured from + 180 to - 180 degrees from east to west with $0^\circ$ referring to a line slightly to the west of Aristillus
7	$R_s$	Selenocentric radius (ft.)
8	$v_i$	Lunar inertial velocity (fps)
9	$r_{as}$	Apolune radius (ft.)
10	$r_{ps}$	Perilune radius (ft.)
11	$h_{as}$	Apolune altitude (n. mi.)
12	$h_{ps}$	Perilune altitude (n. mi.)
13	$\alpha_M$	Vehicle look angle to moon (deg.)
14	$\beta_M$	Vehicle look angle to moon (deg.)
15	$\theta_{LH}$	Vehicle attitude with respect to local horizontal coordinate system (deg.) vehicle pitch
16	$\psi_{LH}$	Vehicle attitude with respect to local horizontal coordinate system, (deg.) vehicle yaw
17	$\Phi_{LH}$	Vehicle attitude with respect to local horizontal coordinate system, (deg.) vehicle roll. Note: In the vehicle nose forward ( $\theta_{LH} = 0.0$ ) orbital mode the Sim Bay center line has a $\Phi_{LH}$ of + 142.25 degrees. In the vehicle nose pointing backward ( $\theta_{LH} = -180$ ) the $\Phi_{LH} = -37.75^\circ$ .

18	$X_M$	Position component in lunar orbit (moon centered), (ft.)
19	$Y_M$	Position component in lunar orbit (moon centered), (ft.)
20	$Z_M$	Position component in lunar orbit (moon centered), (ft.)
21	$\dot{X}_M$	Velocity component in PACSS lunar orbit (moon centered), (fps)
22	$\dot{Y}_M$	Velocity component in PACSS lunar orbit (moon centered), (fps)
23	$\dot{Z}_M$	Velocity component in PACSS lunar orbit (moon centered), (fps)
24	$\ddot{X}_M$	Acceleration component in lunar orbit (moon centered), (ft/sec <sup>2</sup> )
25	$\ddot{Y}_M$	Acceleration component in lunar orbit (moon centered), (ft/sec <sup>2</sup> )
26	$\ddot{Z}_M$	Acceleration component in lunar orbit (moon centered), (ft/sec <sup>2</sup> )
27	$H_{LLS}$	Altitude above the lunar landing site, (ft.)
28	$\dot{H}_{LLS}$	Altitude rate in lunar orbit, (ft.)
29	$\ddot{X}_p$	Sensed acceleration component in platform coordinates ft/sec <sup>2</sup>
30	$\ddot{Y}_p$	Sensed acceleration component in platform coordinates, (ft/sec <sup>2</sup> )
31	$\ddot{Z}_p$	Sensed acceleration component in platform coordinates, (ft/sec <sup>2</sup> )
32	$\dot{X}_p$	Sensed velocity component in platform coordinates, (fps)
33	$\dot{Y}_p$	Sensed velocity component in platform coordinates, (fps)
34	$\dot{Z}_p$	Sensed velocity component in platform coordinates, (fps)

35	$H_0$	Geodetic altitude, (n. mi.)
36	$\phi$	Sun look angle in the sun vector system, (deg.)
37	$\theta$	Sun look angle relative to the stable system, (deg.)
38	$\alpha_s$	Vehicle look angles to the sun, (deg.)
39	$\beta_s$	Vehicle look angles to the sun, (deg.)



1     'ORBIT NO.=1,F8.2,3X.' ALITUDE=.F10.3)

00005600     IF(LINE.EQ.9) LINE=0

00005800     IF(ILINE.EQ.0) WRITE(6,2010)

00005900     FORMAT(IH//)

00006000     2010     D(KK,1)=GANDN(3)

00006100     D(KK,2)=GANDN(4)

00006200     D(KK,3)=GANDN(5)

00006300     D(KK,4)=GANDN(6)

00006400     D(KK,6)=GANDN(15)

00006500     D(KK,7)=GANDN(16)

00006600     D(KK,8)=GANDN(17)

00006700     INT=0

00006800     DO 30 II=2,5

30     IF (D(KK-II).EQ.0.0) INT=INT+1

CONTINUE

IF(INT.EQ.0) GO TO 40

00006900     FORMAT(0BAD G AND N VALUES AT GET \* ,15.214)

00007000     40     IF(GANBN(-3)-GE.-GETS(-2)) GO TO -210

00007100     IF(KK.GE.300) GO TO 220

00007200     45     IF(INSPECT(LT\*101\*AND\*NSECT\*NE\*0) .GT. TO 47

00007300     LZERO=LZERO+1

IF(LZERO.LT.-3) GO TO 20

00007400     IF(M.GT.0.OR.J.GT.0) GO TO 220

IF(KK.GT.0) KK=0

00007500     LZERO=-1

00007600     46     IF(INSPECT(GE.101.0R.NSECT.EQ.0) GO TO 20

00007700     47     I=1

00007800     LZERO=0

50     READ(9,END=200) GET,XRAY

00007900     IF(IJUT(1).GE.2.AND.IFLONG.EQ.0) GO TO 140

IF(GET.LT.GET(-1).OR.GOLD.EQ.GET) GO TO 140

00008000     ISAV=XRAY(1,5)

00008100     DO 54 LL=1,2

ICK=0

00008200     ICK=ICK+1

IF(ISAV.EQ.XRAY(1,5)) ICK=ICK+1

00008300     IF(ISAV.EQ.XRAY(1,6)) ICK=ICK+1

IF(ISAV.EQ.XRAY(2,5)) ICK=ICK+1

00008400     IF(ISAV.EQ.XRAY(2,6)) ICK=ICK+1

IF(ICK.GE.3) GO TO 56

00008500     ISAV=XRAY(1,6)

00008600     WRITE(6,-200.5)-GET,XRAY(1,-5),XRAY(1,-6),XRAY(2,5),XRAY(2,6)

00008700     FORMAT(F\_4.2,(2X,16))

00008800     ISAV=0

00008900     DO 56 IFL G=0

56     IFL G=0

IZERO=0

DO 60 L=1,4

IFLG=IELG\*XRAY(1,-L)

DO 60 K=1,NCH

IF(XRAY(2,-BRL-2\*K).EQ.0) IZERO=IZERO+1

00009000     IF(IZERO.EQ.0.AND.IFLG.EQ.0) GO TO -70

LSYNC=L SYNC+1

C0011C00

00009100

00009200

00009300

00009400

00009500

00009600

00009700

00009800

00009900

00010000

00010100

00010200

00010300

00010400

00010500

00010600

00010700

00010800

00010900

00011000



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00016600 80C GNSAVE(J,K)=D(KK+J-2,K)
-00016700 IF(*NSPEC GT 0) CALL *INTGNTKK+
) C0016800 820 IF(LSYNC GT 0) WRITE(6,2006)(SYNC(J),NSYNC(J),ZERO(J),J=1,LSYNC) 00016800
-00016900 2006 FORMATT20X,*GETS AND NUMBER OF LOST SYNC'S AND ZEROS,*T1H+ 00016900
00017000 X5(F10.2,215,2X))
00017100 WRITE(6,2012) TEOF 00017100
00017200 2012 FORMAT(*TERMINATION CODE =*,13) 00017200
-00017300 RETURN 00017300
00017400 END
```

\*\*\* END OF MEMBER \*\*\* 174 RECORDS PROCESSED.

**EPHENÆS LISTS**

**or APOLLO 15**

**D-14016**

HR	MIN	SEC	LAT.	LNG.	THETA	PSI	PHI	ALTITUDE SPECTRA
222	19	1	800340.88	-24.86	98.05	-59.47	-27.61	138.38 7
222	20	1	800460.88	-24.06	94.92	-57.33	-27.68	137.88 8
222	21	1	800460.88	-23.20	91.82	-54.32	-27.30	137.33 7
222	22	1	800520.88	-22.28	88.76	-51.21	-26.95	136.74 8
222	23	1	800580.88	-21.30	85.74	-48.52	-27.14	136.11 7
222	24	1	800640.88	-20.27	82.76	-44.87	-27.48	135.43 8
222	25	1	800700.88	-19.19	79.82	-41.83	-27.61	134.72 7
222	26	1	800760.88	-18.06	76.91	-39.42	-27.52	133.97 8
222	27	1	800820.88	-16.89	74.04	-36.61	-27.56	133.18 7
222	28	1	800880.88	-15.66	71.20	-33.50	-27.80	132.36 8
222	29	1	800940.88	-14.43	68.40	-30.16	-27.03	131.52 7
222	30	1	801000.88	-13.15	65.62	-27.27	-27.13	130.64 8
222	31	1	801060.88	-11.83	62.87	-24.45	-27.20	129.74 7
222	32	1	801120.88	-10.49	60.15	-21.80	-27.42	128.81 8
222	33	1	801180.88	-9.13	57.44	-19.26	-27.54	127.87 7
222	34	1	801240.88	-7.74	54.75	-16.81	-27.71	126.90 8
222	35	1	801300.88	-6.34	52.08	-12.18	-27.19	125.92 7
222	36	1	801360.88	-4.92	49.42	-9.93	-27.70	124.93 8
222	37	1	801420.88	-3.49	46.77	-6.57	-27.18	123.93 7
222	38	1	801480.88	-2.05	44.12	-3.32	-26.82	122.92 8
222	39	1	801540.88	-0.60	41.47	-0.25	-27.16	121.90 7
222	40	1	801600.88	0.85	38.83	2.69	-25.27	120.88 8
222	41	1	801660.88	2.30	36.17	5.50	-21.72	119.87 7
222	42	1	801720.88	-3.74	33.51	8.36	-21.93	118.85 8
222	43	1	801780.88	5.18	30.84	11.65	-22.50	117.85 7
222	44	1	801840.88	6.61	28.16	14.94	-22.70	116.85 8
222	45	1	801900.88	8.03	25.45	18.05	-22.32	115.86 7
222	46	1	801960.88	9.43	22.72	21.25	-21.94	114.89 8
222	47	1	802020.88	10.81	19.97	23.75	-22.17	113.94 7
222	48	1	802080.88	12.17	17.19	26.45	-22.22	113.00 8
222	49	1	802140.88	13.50	14.38	29.58	-21.59	112.09 7
222	50	1	802200.88	14.86	11.54	32.35	-22.36	111.20 5
222	51	1	802260.88	16.06	8.66	35.35	-22.50	110.34 7
222	52	1	802320.88	17.29	5.74	38.53	-22.19	109.51 8
222	53	1	802380.88	18.48	2.77	41.93	-22.75	108.71 7
222	54	1	802440.88	19.62	-0.23	45.31	-22.03	107.95 8
222	55	1	802500.88	20.72	-3.28	48.30	-22.33	107.23 7
222	56	1	802560.88	21.76	-6.37	50.79	-22.40	106.54 8
222	57	1	802620.88	22.74	-9.51	53.59	-22.40	105.89 7
222	58	1	802680.88	23.66	-12.70	57.42	-22.57	105.29 8
222	59	1	802740.88	24.52	-15.93	60.61	-22.41	104.73 7
223	0	1	802800.88	25.30	-19.20	63.71	-22.09	104.22 8
223	1	1	802860.88	26.02	-22.52	67.61	-22.07	103.75 7
223	2	1	802920.88	26.66	-25.88	97.34	-41.49	103.34 6
223	2	5	802977.88	27.19	-29.11	0.0	0.0	102.99 0
223	3	5	803037.88	27.67	-32.54	174.46	-42.53	102.67 0
223	4	5	803097.88	28.07	-35.99	143.78	-22.36	102.41 0
223	5	5	803157.88	28.36	-39.47	132.18	-12.27	102.20 6
223	6	5	803217.88	28.60	-42.97	129.41	-12.55	102.04 0
223	7	5	803277.88	28.73	-46.47	126.79	-12.20	101.94 0

IEF2371 213 ALLOCATED TO SYSPRINT  
 IEF2371 214 ALLOCATED TO SYSPRINT  
 IEF2371 0C3 ALLOCATED TO FTC9FC01  
 IEF2371 0C3 ALLOCATED TO FTC9F002  
 IEF2371 332 ALLOCATED TO FTC8F001  
 IEF2371 213 ALLOCATED TO SYSDUMP

Apollo 15  
 D-14017  
 O9A

GET IN SEC	HR	MIN	GET IN SEC	HR	MIN	TOTAL MISSING
0.	0	0	0.	0	0	85 10
310277.	86	11	TO	310277.	85	85 51
316673.	87	57	TO	316673.	87	1 8
323849.	89	57	TO	323849.	89	24
337438.	93	43	TO	337438.	93	54
341363.	94	49	TO	341363.	94	12 13
392858.	109	3	TO	392858.	107	2
407609.	113	3	TO	407609.	112	8
411374.	114	16	TO	411374.	113	27
414355.	115	5	TO	414355.	114	24
421549.	117	5	TO	421549.	115	28
424131.	117	48	TO	424131.	117	21
434179.	120	36	TO	434179.	119	48
435777.	121	2	TO	435777.	120	51
439127.	121	58	TO	439127.	121	0
443019.	123	3	TO	443019.	122	10
449965.	124	59	TO	449965.	124	14
454766.	126	19	TO	454766.	126	0
456461.	126	47	TO	456461.	126	25
470689.	130	44	TO	470689.	129	41
485173.	134	46	TO	485173.	135	15
494933.	137	28	TO	494933.	137	0
502303.	139	31	TO	502303.	139	52
503950.	139	59	TO	503950.	141	0
516291.	143	24	TO	516291.	143	12
523717.	145	28	TO	523717.	145	15
527674.	146	24	TO	527674.	146	11
528720.	146	52	TO	528720.	147	14
532726.	147	58	TO	532726.	149	48
544811.	151	20	TO	544811.	151	0
549208.	152	33	TO	549208.	152	5
551653.	153	14	TO	551653.	153	3
556074.	154	27	TO	556074.	154	16
561502.	155	27	TO	561502.	154	0
576199.	158	58	TO	576199.	157	2
575610.	159	53	TO	575610.	160	0
576945.	160	15	TO	576945.	160	8
580565.	161	16	TO	580565.	161	19
583947.	162	12	TO	583947.	162	21
587816.	163	16	TO	587816.	163	0
590278.	163	57	TO	590278.	167	25
605460.	168	10	TO	605460.	174	3
633238.	175	39	TO	633238.	175	33
634295.	176	11	TO	634295.	176	6
639499.	177	38	TO	639499.	183	30
662236.	183	57	TO	662236.	184	46
672123.	186	11	TO	672123.	186	15
674698.	187	24	TO	674698.	187	16
679717.	188	48	TO	679717.	188	27
680892.	189	8	TO	680892.	191	27
691603.	192	6	TO	691603.	192	0
700787.	194	39	TO	700787.	194	47
704097.	195	34	TO	704097.	195	4
709668.	197	7	TO	709668.	199	0
733249.	203	40	TO	733249.	203	16
736182.	204	29	TO	736182.	204	0
738444.	205	2	TO	738444.	207	12
747405.	207	36	TO	747405.	207	2
750961.	208	36	TO	750961.	208	15
754495.	209	34	TO	754495.	209	0
761753.	211	35	TO	761753.	211	15
767221.	213	7	TO	767221.	215	13
778691.	216	18	TO	778691.	216	0
786052.	218	20	TO	786052.	218	11
792447.	220	7	TO	792447.	220	15

END OF DATA FILE 1  
 TOTAL NUMBER OF SPECTRA ON FILE 1 = 26843

GET IN SEC	MIN	GET IN SFC	HR	MIN	TOTAL MISSING
326999.	0	TO	226955.	90	35
330596.	90	TO	330556.	117	9
425074.	91	TO	425074.	118	25
428583.	118	TO	428583.	119	6
431324.	119	48	431324.	119	11
480944.	119	35	480944.	133	19
482224.	133	35	482224.	133	12
482407.	134	0	482407.	134	3
509033.	141	23	509033.	141	59
511144.	141	59	511144.	147	13
5337290.	149	14	5337290.	149	0
539520.	149	58	539520.	155	17
563093.	156	21	563093.	156	5
566489.	157	21	566489.	157	0
568696.	157	58	568696.	163	4
590422.	164	50	590422.	167	59
603655.	167	31	603655.	174	21
628524.	174	35	628524.	174	3
659310.	183	8	659310.	183	21
685376.	190	22	685376.	189	59
685567.	190	42	685567.	190	0
688086.	191	8	688086.	197	15
714976.	198	36	714976.	198	0
716862.	199	77	716862.	205	11
740267.	205	37	740267.	205	59
745638.	207	7	745638.	213	5

END OF DATA FILE 2  
TOTAL NUMBER OF SPECTRA ON FILE 2 = 7086

```

IEFF1421 - STEP WAS EXECUTED - COND CODE 0000
IEFF2851 VOL SER NOS=M2SCR4.TCRLSS54.LODMOD PASSED
IEFF2851 VOL SER NOS=M2SCR4.TCRLSS54.SYSIN
IEFF2851 VOL SER NOS=M2SCR5.
IEFF2851 SYS75086.T112209.RV000.TCRLSS54.S0000012 DELETED
IEFF2851 VOL SER NOS=M2SCR5.TCRLSS54.SYSIN
IEFF2851 SYS75086.T112209.SY000.TCRLSS54.R0000005 SYSCUT
IEFF2851 SYS75086.T112209.SV000.TCRLSS54.R0000006 DELETED
IEFF2851 VOL SER NOS=M2SCR4.TCRLSS54.R0000007 DELETED
IEFF2851 SYS75086.T112209.SV000.TCRLSS54.R0000007 KEPT
IEFF2851 VOL SER NOS=M2SCR4.TCRLSS54.R0000008 KEPT
IEFF2851 VOL SER NOS=CA0439.TCRLSS54.R0000009 KEPT
IEFF2851 VOL SER NOS=CA0439.TCRLSS54.R0000010 DELETED
IEFF2851 SYS75086.T112209.SV000.TCRLSS54.R0000011 DELETED
IEFF2851 VOL SER NOS=M2SCR4.
IEFF2851 STEP /GO / START 75086.1123 CPU 0MIN 08.67SEC MAIN 96K LCS 0K
IEFF3731 STEP /GO / STOP 75086.1127 CPU 0MIN 08.67SEC MAIN 96K STEP TIME = .19 MIN$=(CPU=.14,IO=.05)
IEFF3731 STEP /GO / RETURN CODE = 0000
-- THIS STEP DOES NOT USE AT LEAST 5CK BYTES OF CORE THAT IT REQUESTS -- PLEASE DECREASE THE REGION PARAMETER
-- THIS STEP DOES NOT USE AT LEAST 5CK BYTES OF CORE THAT IT REQUESTS -- PLEASE DECREASE THE REGION PARAMETER
XXDEFUALT NOTIFY MODE=ALL
XXDEFUALT PROC MODE=USRID=,MSG= NOTIFY * 22 JUN 72 * 00000010
XXNOTIFY EXEC PGM=NOTIFY,REGION=20K,COND=EVEN,PARM=,USRID=,MSG= 00000020
IEF6531 SUBSTITUTION JCL - PGM=NCTIFY,REGION=20K,COND=EVEN,PARM=ALL,,
IEFF1421 - STEP WAS EXECUTED - COND CODE CCCC
IEFF3731 STEP /NOTIFY / START 75086.1127 CPU 0MIN 00.05SEC MAIN 8K LCS 0K
IEFF3731 STEP /NOTIFY / STOP 75086.1127 CPU 0MIN 00.05SEC MAIN 8K STEP TIME = .17 DRUM= .08 TAPE= .00 MIN$=(CPU=.00,CELL=.00,IO=.00,THR=.00)
IEFF2851 SYS75086.T112209.RV000.TCRLSS54.LODMOD DELETED
IEFF3751 JOB /TCRLSS54/ START 75086.1122 CPU 0MIN 09.02 SEC
IEFF3761 JOB /TCRLSS54/ STOP 75086.1127 CPU M2
-- SYSTEM=MVT-21 (11-15-73) TOTAL TIME = .35 MIN$=(CPU=.15,IO=.20,CELL=.00,THR=.35)
-- JOB 0259- THERE WERE 01 TAPES MOUNTED FOR THIS JOB. TAPE MOUNT CHARGE WAS 00.0 MINUTES.

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*Apollo 16*  
D-22495

08A

GET IN SEC	HR	MIN	SEC	GET IN SEC	HR	MIN	SEC	GET IN SEC	HR	MIN	SEC
0	0	0	0	0	0	0	0	0	0	0	0
291728.	81	2	0	291728.	81	2	0	291728.	81	2	0
295676.	82	7	0	295676.	82	7	0	295676.	82	7	0
302423.	84	0	0	302423.	84	0	0	302423.	84	0	0
309066.	85	51	0	309066.	88	11	0	309066.	88	11	0
319298.	88	41	0	319298.	88	51	0	319298.	88	51	0
322975.	89	42	0	322975.	90	6	0	322975.	90	6	0
328314.	91	1	0	328314.	91	35	0	328314.	91	35	0
331488.	92	4	0	331488.	91	17	0	331488.	91	17	0
385071.	96	57	0	385071.	106	17	0	385071.	106	17	0
391666.	108	47	0	391666.	109	58	0	391666.	109	58	0
398332.	110	38	0	398332.	110	53	0	398332.	110	53	0
401770.	111	36	0	401770.	111	56	0	401770.	111	56	0
404248.	112	37	0	404248.	114	48	0	404248.	114	48	0
415886.	115	31	0	415886.	115	53	0	415886.	115	53	0
420131.	116	42	0	420131.	116	52	0	420131.	116	52	0
423640.	117	42	0	423640.	117	51	0	423640.	117	51	0
433025.	120	17	0	433025.	122	17	0	433025.	122	17	0
442233.	122	50	0	442233.	122	54	0	442233.	122	54	0
449092.	124	44	0	449092.	124	50	0	449092.	124	50	0
452058.	125	34	0	452058.	125	41	0	452058.	125	41	0
455631.	126	33	0	455631.	127	12	0	455631.	127	12	0
461802.	128	16	0	461802.	129	36	0	461802.	129	36	0
466710.	129	38	0	466710.	130	16	0	466710.	130	16	0
470475.	130	41	0	470475.	130	37	0	470475.	130	37	0
477461.	132	37	0	477461.	132	51	0	477461.	132	51	0
480587.	133	29	0	480587.	133	40	0	480587.	133	40	0
484552.	134	35	0	484552.	134	23	0	484552.	134	23	0
488237.	135	37	0	488237.	135	40	0	488237.	135	40	0
490579.	136	32	0	490579.	138	16	0	490579.	138	16	0
498756.	138	32	0	498756.	138	55	0	498756.	138	55	0
502370.	139	32	0	502370.	139	37	0	502370.	139	37	0
506207.	140	36	0	506207.	140	44	0	506207.	140	44	0
513361.	142	36	0	513361.	143	23	0	513361.	143	23	0
519356.	144	15	0	519356.	145	15	0	519356.	145	15	0
530411.	147	20	0	530411.	147	30	0	530411.	147	30	0
534448.	148	27	0	534448.	148	32	0	534448.	148	32	0
541571.	150	27	0	541571.	151	15	0	541571.	151	15	0
558301.	155	5	0	558301.	155	14	0	558301.	155	14	0
562834.	156	20	0	562834.	157	21	0	562834.	157	21	0
570084.	158	21	0	570084.	158	26	0	570084.	158	26	0
572402.	159	0	0	572402.	159	21	0	572402.	159	21	0
576916.	160	15	0	576916.	162	15	0	576916.	162	15	0
586663.	162	57	0	586663.	163	19	0	586663.	163	19	0
590891.	164	8	0	590891.	164	64	0	590891.	164	64	0
604528.	167	55	0	604528.	167	60	0	604528.	167	60	0
615083.	170	51	0	615083.							

END OF DATA FILE 2 = 6965  
TOTAL NUMBER OF SPECTRA ON FILE 2 =

Apollo 15

THE COUNCIL OF THE STATE = 27004 MILES 1

July 30, - Aug 4, 1971

094

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0-141017

000000241	00000171	000 0007A	000 00033	000 00016	000 0000C	000 000B8	000 00094	002 80000	000 00090
458D1056	42469 999	421 A9C28	C215720A3	427 368F5	40C 00005	C05 99999	42BE5C28	009A000	00000127
000000088	00000008	000 00009	000 00009	000 00008	000 00006	000 00007	000 00015	000 00015	000 00014
00000001D	00000011	000 00009	000 00003	000 00003	000 00002	000 00035	000 00018	000 00014	000 00022
000000014	00000004	000 00005	000 00007	000 00002	000 00002	000 00006	000 00016	000 00015	000 00065
000000020	00000008	000 00001	000 0008F	000 0007	002 80000	000 00090	45BD1056	424 69999	421AB0A3
C215E147	4273547	40B61E3	C05C28F5	428E75C2	0094000	000 00127	000 00088	000 00090	000 0009
000000007	00000005	000 00006	000 00021	000 00082A	000 00018	000 00019	000 00023	000 00017	000 0007
00000000A	00000003	000 00018	000 00082A	000 00012	000 0000E	000 00010	000 00010	000 00013	000 00005
000000003	00000028	000 000803	000 0001C8	000 000115	000 00054	000 00021	000 00010	000 00010	000 00008
00000095	0300007F								

50 RECORDS IN FILE 2 OF TAPE

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IEC209I YZJRJJ5 J0010 OC♦ TR=001 T=000 *EG=000 CL=000 .N000 .SI0=00192
IEFI421 - STEP WAS EXECUTED - COND CODE 0000
IEF285I VOL SER NOS= K35CR2. PASSED
IEF285I SY75315.T115432.RV000.YZJRJJ5.S0000.0395 SYBIN
IEF285I VOL SER NOS= K35CR2.
IEF285I SY75315.T115432.RV000.YZJRJJ5.S0000.0395 DELETED
IEF285I VOL SER NOS= K35CR2.
IEF285I SY75315.T115432.RV000.YZJRJJ5.R0000.0391 SY8 OUT
IEF285I VOL SER NOS= K35CR4.
IEF285I SY75315.T115432.RV000.YZJRJJ5.R0000.0392 DELETED
IEF285I VOL SER NOS= K35CR4.
IEF285I SY75315.T115432.RV000.YZJRJJ5.R0000.0393 DELETED
IEF285I VOL SER NOS= K35CR5.
IEF285I SY75315.T115432.RV000.YZJRJJ5.R0000.0394 KPT
IEF285I VOL SER NOS= J0010.
IEF200E K 0C4.JJ0010.YZJRJJ5.GO
IEF3731 STEP /GO / START 75315.1923
IEF3741 STEP /GO / STOP 75315.1923
- STEP 03 - RETURN CODE = 0000 10 IN SECS. DISK= 2.65 DRUM= .48. TAPE= .24 MINS (CPU= .11.10E= .01
IEF285I SY75315.T115432.RV000.YZJRJJ5.TLOHOD OK
IEF285I VOL SER NOS= K35CR2.
IEF3751 JOB /YZJRJJ5/ START 75315.1920
IEF3761 JOB /YZJRJJ5/ STOP 75315.1927 CPU OMN 12.5 SEC
- SYSTEM=MVT-21 (11-21-73) K3
JOB 0418 TOTAL TIME=.60 MINS (CPU=.20.10E=.01 TAPE=.128. DRUM=.00.0 THRE=.34 TIME=19.27.39.43 DATE=11-11-75

THERE WERE 03 TAPES MOUNTED FOR THIS JOB. TAPE MOUNT CHARGE WAS 00.0 MINUTES.

```

16,384

664

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sec

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sec

RECORD = 1 OF FILE 1

LENGTH = 20004 BYTES

DATA AND

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*Apollo 15*~~14016~~

Aug 4, 1971

Aug 7, 1971

Aug 8, 1971

Orbit 75

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RECORD LENGTH = 456 OF FILE 13680 BYTES

456 RECORDS IN FILE 1 OF TAPE

ENTRY ADDRESS 00  
 TOTAL LENGTH 170E0  
 \*\*\*\*CSFC - DOES NOT EXIST BUT HAS BEEN ADDED TO DATA SET

```

IEF142I - STEP WAS EXECUTED - COND CODE 0000          KEPT
IEF285I SYS2 LOADLIB                                KEPT
IEF285I VOL SER NOS= K3SYS4.
IEF285I SYS2 DUMMY
IEF285I VOL SER NOS= K3SYS2.
IEF285I SYS2 DUMMY
IEF285I VOL SER NOS= K3SYS2.
IEF285I SYS1 FORTLIB
IEF285I VOL SER NOS= K3SYS6.
IEF285I SYS2 FORTLIB
IEF285I VOL SER NOS= K3SYS2.
IEF285I SYS1 PL1LIB
IEF285I VOL SER NOS= K3SYS6.
IEF285I SYS1 FORTSSP
IEF285I VOL SER NOS= K3SYS2.
IEF285I SYS2 COBLIB
IEF285I VOL SER NOS= K3SYS6.
IEF285I SYS1 ALGLIB
IEF285I VOL SER NOS= K3SYS6.
IEF285I SYS75315.T115432.RV000.YZ.JR.JJ3.LDMOD      PASSED
IEF285I VOL SER NOS= K3SCR3.
IEF285I SYS75315.T115432.SV000.YZ.JR.JJ3.R0000375   SYSOUT
IEF285I VOL SER NOS= K3SCR2
IEF285I SYS75315.T115432.SV000.YZ.JR.JJ3.R0000376   SYSOUT
IEF285I VOL SER NOS= K3SCR3.
IEF285I SYS75315.T115432.RV000.YZ.JR.JJ3.R0000377   DELETED
IEF285I VOL SER NOS= K3SCR4
IEF285I SYS75315.T115432.RV000.YZ.JR.JJ3.S0000378   SYSIN
IEF285I VOL SER NOS= K3SCR4.
IEF285I SYS75315.T115432.RV000.YZ.JR.JJ3.S0000378   DELETED
IEF285I VOL SER NOS= K3SCR4.
IEF373I STEP /LINK / START 75315.1918 CPU 0MIN 01.69SEC MAIN 130K LCS 0K
IEF374I STEP /LINK / STOP 75315.1918 CPU 0MIN 01.69SEC MAIN 130K LCS 0K
- STEP 02 - RETURN CODE = 0000 10 TN SEC3. DISK= 10-30-DRUM- STEP TIME = 02.10Z .16
XXGD EXEC PGM= *LINK SYSMOD COND=(4,LT),REGION=7 0K
XXFD T0SF001 DD DDNAME=DATA5
XXFT06F001 DD SYSOUT=EQU,DCB=(RECFM=VB,LRECL=137,BLKSIZE=6BLKSIZE)
IEF653I SUBSTITION JCL - SYSOUT=A,DCB=(RECFM=VBA,LRECL=137,BLKSIZE=7265)
XXFT02F001 DD SYSOUT=B,DCB=(RECFM=VBA,LRECL=7280,BLKSIZE=80)
XXSYSPRINT DD SYSOUT=C,DCB=(RECFM=VBA,LRECL=137,BLKSIZE=6BLKSIZE)
IEF653I SUBSTITUTION JCL - SYSOUT=A,DCB=(RECFM=VBA,LRECL=137,BLKSIZE=7265)
XX // GO.FT08F001 DD UNIT=9TRACK,DISP=(OLD,KEEP),LABEL=(01,BLP,+INI).
// DCB=(BLKSIZE=3200,RECFM=U,DEN=3),
// GO.DATAS DD *
IEF236I ALLOC. FOR YZ.JR.JJ3 GO
IEF237I 232 ALLOCATED TO PGW=* DD
IEF237I 231 ALLOCATED TO F10SF001
IEF237I 332 ALLOCATED TO F10F001
IEF237I 331 ALLOCATED TO F1CFS001
IEF237I 231 ALLOCATED TO SYSPRINT
IEF237I 232 ALLOCATED TO SYSPRINT
IEF237I 0C3 ALLOCATED TO F10SF001
    
```

Apollo 16  
 D-22495  
 OSA

RECORD 1 OF FILE 1  
 LENGTH = 27004 BYTES

697C0000	00260000	00000010	45165E28	413B3333	C0428F5C	C23FC3D	♦484F5C	C07D7A3	C0147AE1
428DEE14	00940000	00000015	00000012	00000007	00000004	0000000A	00000004	00000008	00000007
0000052D	00000011	0000000A	0000000A	0000000B	00000004	00000002			00000001

April 20 - April 24  
 1972

IEC2091	Y <sub>Z</sub> J <sub>R</sub> J <sub>J</sub> J <sub>3</sub>	J <sub>J</sub> 0006	OC3	TR=000	TW=000	EG=000	CL=018	N=000	SIG=00176
IEC2091	Y <sub>Z</sub> J <sub>R</sub> J <sub>J</sub> J <sub>3</sub>	J <sub>J</sub> 006	OC3	TR=000	TW=000	EG=000	CL=018	N=000	SIG=00174
IEF4-21	STEP WAS	EXECUTE-B	-GND-	-GND-	-GND-	-GND-	-GND-	-GND-	
IEF2851	SYS75315	T115432	RV000	YZ	JRJJJ3	.L0DMD	PASSED		
IEF2851	VOL SER	NOS=	K3SCR3.						
IEF2851	SYS75315	T115322	RV000	YZ	JRJJJ3	.S0000383	SYSIN		
IEF2851	VOL SER	NOS=	K3SCR2.						